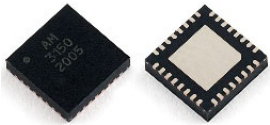


AM3150 – Filter Bank

Digitally Tunable 30 to 550 MHz Lowpass

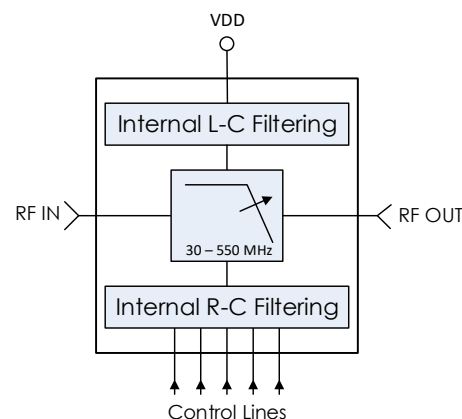


AM3150 is a digitally tunable lowpass filter covering the 30 MHz to 550 MHz frequency range. The filter provides 32 selectable lowpass cutoff states with 5 digital control bits. The tunable lowpass filter can be combined with one of Mercury's tunable highpass filters to provide a flexible bandpass filter solution. AM3150 is packaged in a 5mm QFN package and operates over the -40C to +85C temperature range.

FEATURES

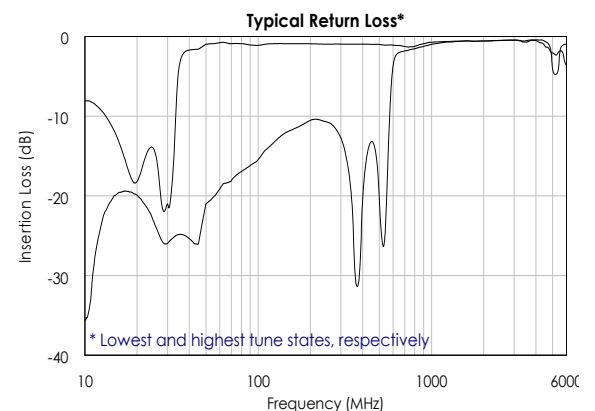
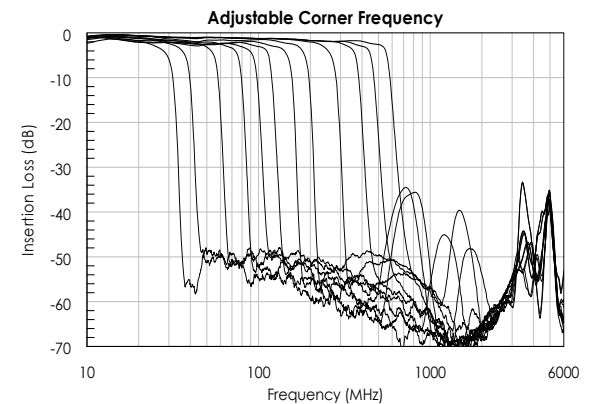
- Digitally Tunable Lowpass Filter
- Integrated Control Line Filtering
- +3.3V to +5.0V Supply
- 1.5 dB Insertion Loss
- +40 dBm Input IP3
- +24 dBm Input P1dB
- -40C to +85C Operation

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE

(Data taken in Configuration A. See Typical Application section for more information.)



CONTENTS

FEATURES 1

CHARACTERISTIC PERFORMANCE 1

FUNCTIONAL DIAGRAM 1

REVISION HISTORY 2

PIN LAYOUT AND DEFINITIONS 3

SPECIFICATIONS..... 4

TYPICAL PERFORMANCE 7

TYPICAL APPLICATION..... 9

TYPICAL APPLICATION (CONTINUED)..... 10

EVALUTATION PC BOARD..... 11

RELATED PARTS..... 11

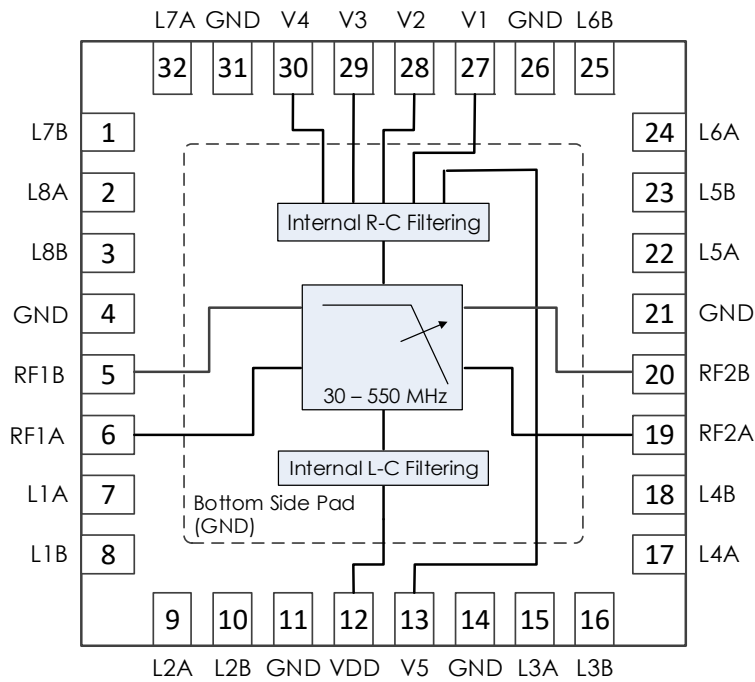
COMPONENT COMPLIANCE INFORMATION..... 12

REVISION HISTORY

Date	Revision	Notes
April 2, 2020	1	Initial Release.
May 13, 2020	2	Updated Performance.
July 8, 2020	3	Added Timing Characteristics.
July 13, 2020	3.1	Pin Layout Image Corrected.
October 23, 2020	4	Added information for a smaller form factor configuration.
January 12, 2021	5	Added control bits current drive requirements. Added Input IP2 information.
July 31, 2024	6	Changed to Mercury branding. No content changes.

PIN LAYOUT AND DEFINITIONS

Note: All Non-Named Pins are NC or GND



Pin	Name	Function
1	L7B	L7 Connection B
2	L8A	L8 Connection A
3	L8B	L8 Connection B
4	GND	Ground - Common
5	RF1B	RF Input - 50 Ohms - DC Coupled, External DC Block Required
6	RF1A	RF Input - 50 Ohms - DC Coupled, External DC Block Required
7	L1A	L1 Connection A
8	L1B	L1 Connection B
9	L2A	L2 Connection A
10	L2B	L2 Connection B
11	GND	Ground - Common
12	VDD	DC Power Input
13	V5	Low Pass Filter Control Bit E (MSB)

Pin	Name	Function
14	GND	Ground - Common
15	L3A	L3 Connection A
16	L3B	L3 Connection B
17	L4A	L4 Connection A
18	L4B	L4 Connection B
19	RF2A	RF Output - 50 Ohms - DC Coupled, External DC Block Required
20	RF2B	RF Output - 50 Ohms - DC Coupled, External DC Block Required
21	GND	Ground - Common
22	L5A	L5 Connection A
23	L5B	L5 Connection B
24	L6A	L6 Connection A
25	L6B	L6 Connection B
26	GND	Ground - Common
27	V1	Low Pass Filter Control Bit A (LSB)
28	V2	Low Pass Filter Control Bit B
29	V3	Low Pass Filter Control Bit C
30	V4	Low Pass Filter Control Bit D
31	GND	Ground - Common
32	L7A	L7 Connection A
Bottom Pad	GND	Ground - Common

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+6.0 V
RF Input Power		+27 dBm
Operating Junction Temperature	-40 C	+150 C
Storage Temperature Range	-55 C	+150 C

Note: Any device operation beyond the Absolute Maximum Ratings may result in permanent damage to the device. The values listed in this table are extremes and do not imply functional operation of the device at these or any other conditions beyond what is listed under Recommended Operating Conditions. Any part subjected to conditions outside of what is recommended for an extended amount of time may suffer from reliability concerns.

Handling Information

	Minimum	Maximum
Storage Temperature Range (Recommended)	-50 C	+125 C
Moisture Sensitivity Level	MSL 3	



Mercury products are electrostatic sensitive.
Follow safe handling practices to avoid damage.

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+3.0 V	+5.0 V	+5.2 V
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+125 C

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage		+3.0 V	+5.0 V	+5.2 V
DC Supply Current	VDD = +5.0 V		1 mA	
Power Dissipated	VDD = +5.0 V		5 mW	
Logic Level Low		-0.1 V		+0.5 V
Logic Level High		+2.0 V		+VDD V
Logic Current Drive	Vx = +3.3V	100 μ A		
	Vx = +5V	200 μ A		

RF Performance

(VDD = +5.0V, T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		30 MHz		550 MHz
Insertion Loss	Lowest Tune State, CFG A		-3 dB	
	Highest Tune State, CFG A		-1.5 dB	
Return Loss	Lowest Tune State, CFG A		-14 dB	
	Highest Tune State, CFG A		-18 dB	
Input IP3	VDD = +5.0V		+40 dBm	
Input IP2	VDD = +5.0V		+60 dBm	
Input P1dB	Lowest Tune State		+21 dBm	
	Highest Tune State		-24 dB	

Timing Characteristics

VDD = +5.0V, T = 25 °C unless otherwise specified)

Parameter	Minimum	Typical	Maximum
Tuning Speed, Rise (Out of Band → In Band)		100 ns	
Tuning Speed, Fall (In Band → Out of Band)		50 ns	
Settling Time, Rise (Out of Band → In Band)			500 ns
Settling Time, Fall (In Band → Out of Band)			500 ns

Notes:

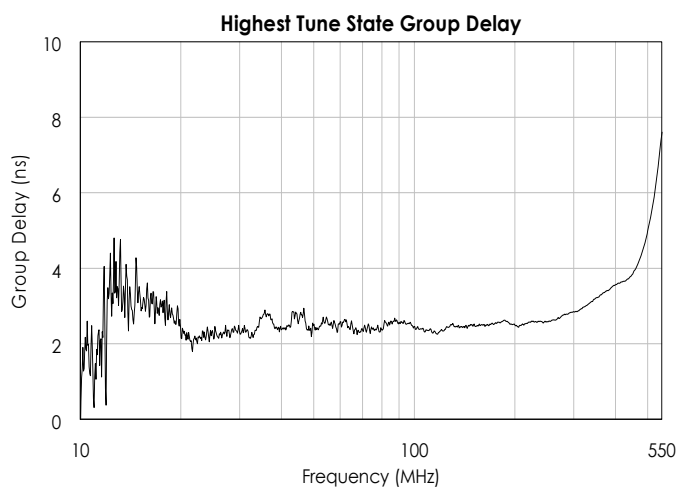
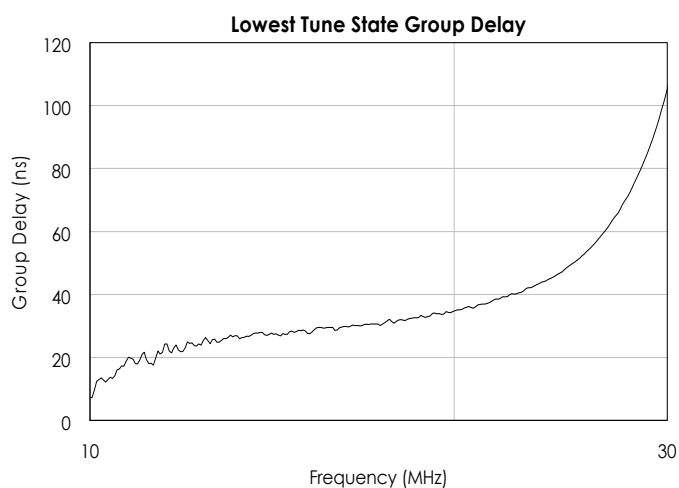
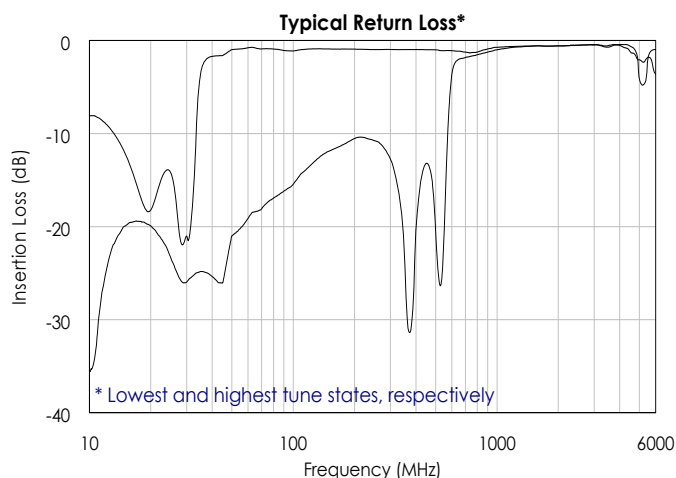
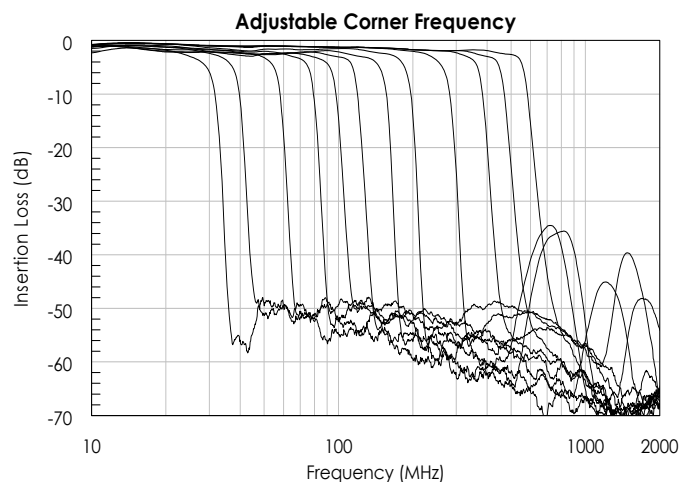
- Tuning speed rise defined by 50% CTL to 90% RF.
- Tuning speed fall defined as 50% CTL to 10% RF.
- Settling time error band defined to be within 1% of steady state value.

State Table

E	D	C	B	A	Typical Cutoff Freq. (MHz)
L	L	L	L	L	28
L	L	L	L	H	29
L	L	L	H	L	30
L	L	L	H	H	31
L	L	H	L	L	32
L	L	H	L	H	33
L	L	H	H	L	35
L	L	H	H	H	36
L	H	L	L	L	43
L	H	L	L	H	46
L	H	L	H	L	49
L	H	L	H	H	53
L	H	H	L	L	65
L	H	H	L	H	73
L	H	H	H	L	89
L	H	H	H	H	112
H	L	L	L	L	141
H	L	L	L	H	145
H	L	L	H	L	149
H	L	L	H	H	153
H	L	H	L	L	163
H	L	H	L	H	168
H	L	H	H	L	174
H	L	H	H	H	180
H	H	L	L	L	213
H	H	L	L	H	224
H	H	L	H	L	239
H	H	L	H	H	254
H	H	H	L	L	318
H	H	H	L	H	357
H	H	H	H	L	439
H	H	H	H	H	550

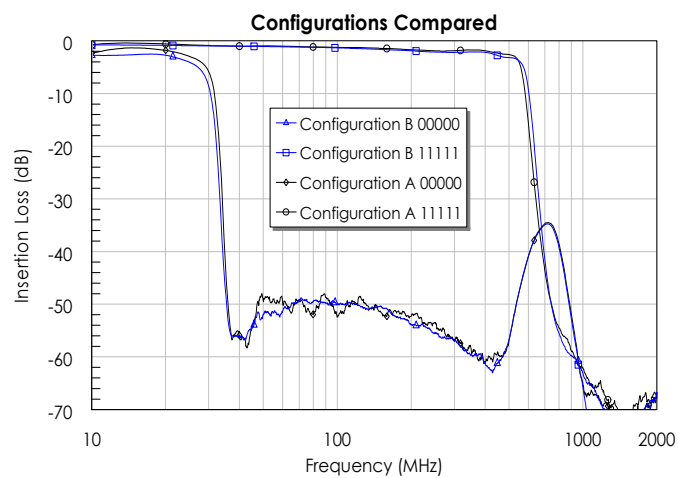
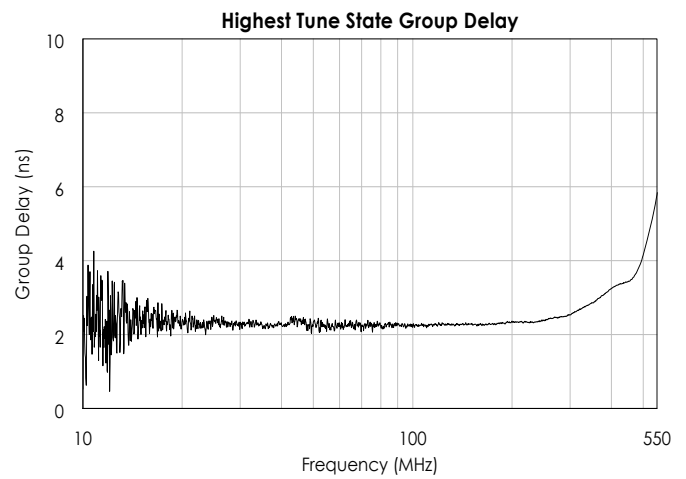
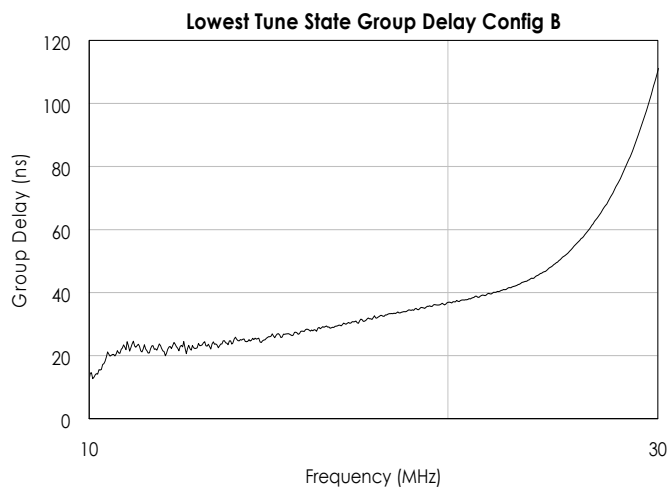
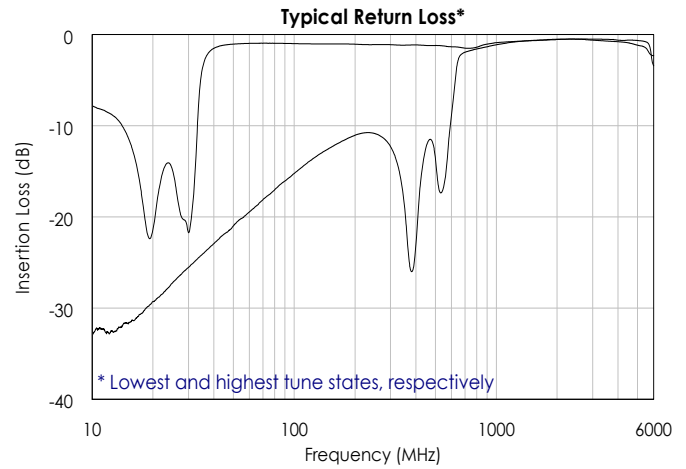
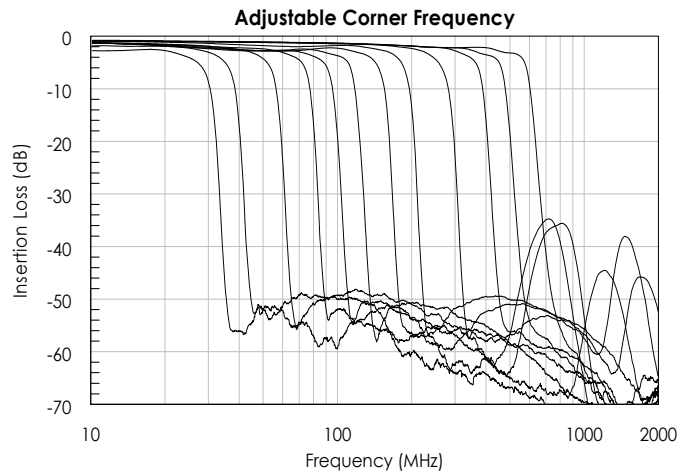
TYPICAL PERFORMANCE

(**Note:** Only some states shown for simplicity. Download provided s-parameters for more information. Data shown is for **Configuration A**, VDD = 5V)



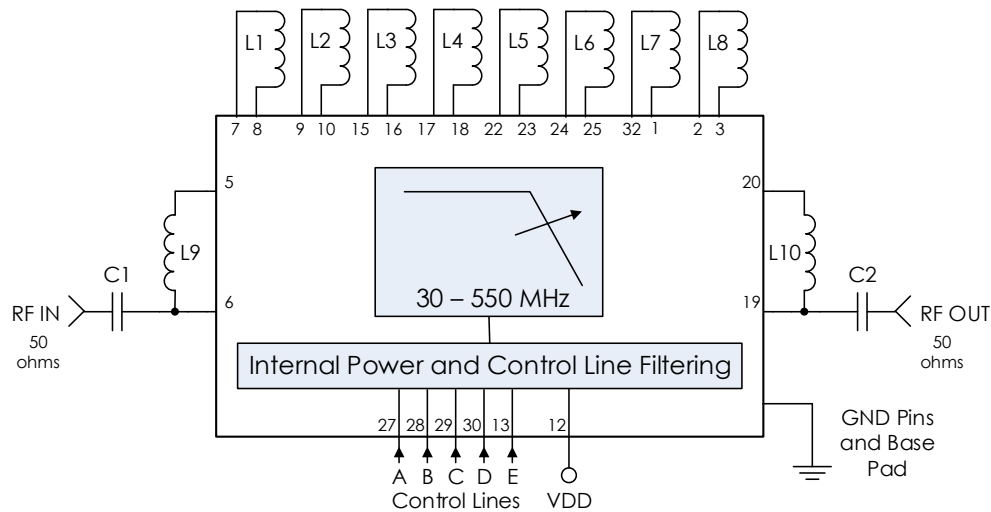
TYPICAL PERFORMANCE (CONTINUED)

(**Note:** Only some states shown for simplicity. Download provided s-parameters for more information. Data shown is for **Configuration B**, VDD = 5V))



TYPICAL APPLICATION

Configuration A: Best Performance



Recommended Component List (or Equivalent)

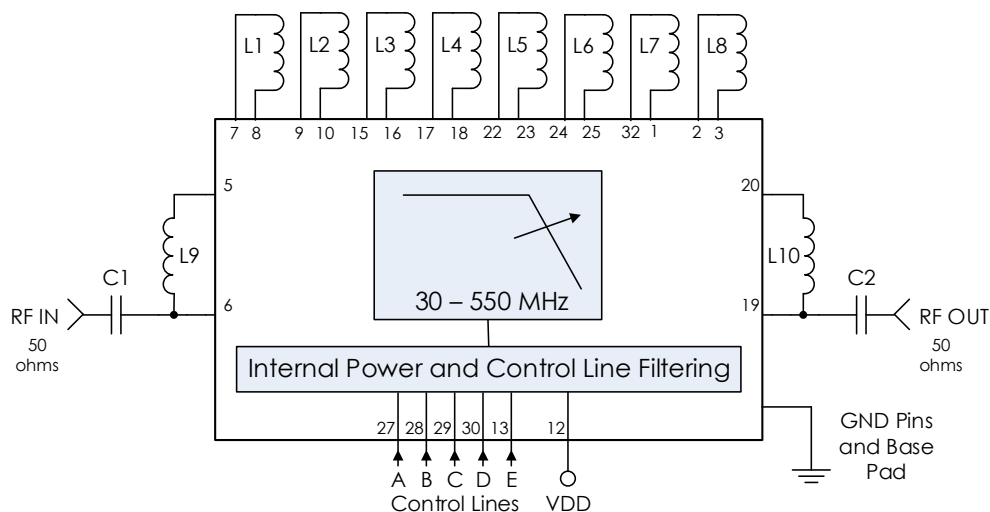
Part	Value	Part Number	Manufacturer
C1, C2	0.1 μ F	0201BB104KW160	Passives Plus
L1, L4	18 nH	0805HP-18NXGRB	Coilcraft
L2, L3	27.3 nH	0908SQ-27NGLB	Coilcraft
L5, L8	150 nH	0805HP-151XGRB	Coilcraft
L6, L7	120 nH	0805HP-121XGRB	Coilcraft
L9, L10	11 nH	0302CS-11NXJEU	Coilcraft

Notes:

1. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
2. VDD and control lines filtered internally providing high frequency isolation.
3. RC time constant is 20ns for control lines.
4. See Application Notes on product page for more information about how to layout for best performance.

TYPICAL APPLICATION (CONTINUED)

Configuration B: Smallest Form Factor



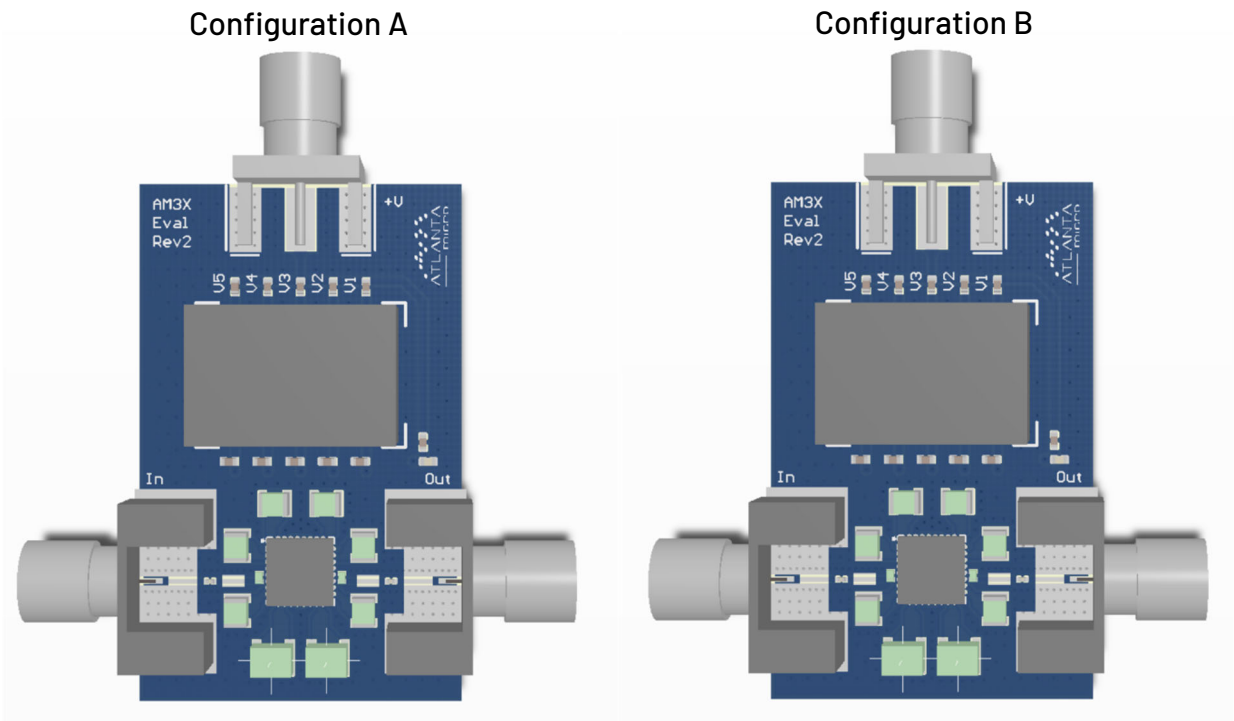
Recommended Component List (or Equivalent)

Part	Value	Part Number	Manufacturer
C1, C2	0.1 μ F	0201BB104KW160	Passives Plus
L1, L4	18 nH	0603HP-18NXGEU	Coilcraft
L2, L3	27 nH	0603HP-27NXGEU	Coilcraft
L5, L8	150 nH	0603HP-R15XGEU	Coilcraft
L6, L7	120 nH	0603HP-R12XGEU	Coilcraft
L9, L10	11 nH	0302CS-11NXJEU	Coilcraft

Notes:

1. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
2. VDD and control lines filtered internally providing high frequency isolation.
3. RC time constant is 20ns for control lines.
4. See Application Notes on product page for more information about how to layout for best performance.

EVALUTATION PC BOARD



RELATED PARTS

Part Number		Description
AM3151	20 MHz to 320 MHz	Digitally Tunable Highpass Filter
AM3029	1.5 GHz to 3.0 GHz	Digitally Tunable Lowpass Filter
AM3030	3.5 GHz to 6.5 GHz	Digitally Tunable Lowpass Filter
AM3034	150 MHz to 450 MHz	Digitally Tunable Lowpass Filter
AM3035	500 MHz to 1.2 GHz	Digitally Tunable Lowpass Filter
AM3039	9 GHz to 18.0 GHz	Digitally Tunable Lowpass Filter
AM3107	6.0 GHz to 12.0 GHz	Digitally Tunable Lowpass Filter
AM3110	18.0 GHz to 26.5 GHz	Digitally Tunable Lowpass Filter

COMPONENT COMPLIANCE INFORMATION

RoHS: Mercury Systems, Inc. hereby certifies that all products comply with the EC Directive 2011/65/EC on the Restriction of Hazardous Substances, commonly known as EU-RoHS 6 and 10. All products supplied by Mercury shall be compliant with the European Directive 2011/65/EC based on the following substance list.

Substance List	Allowable Maximum Concentration
Lead (Pb)	<1000 PPM (0.1% by weight)
Mercury (Hg)	<1000 PPM (0.1% by weight)
Cadmium (Cd)	<75 PPM (0.0075% by weight)
Hexavalent Chromium (CrVI)	<1000 PPM (0.1% by weight)
Polybrominated Biphenyls (PBB)	<1000 PPM (0.1% by weight)
Polybrominated Diphenyl ethers (PBDE)	<1000 PPM (0.1% by weight)
Decabromodiphenyl Deca BDE	<1000 PPM (0.1% by weight)
Bis (2-ethylhexyl) Phthalate (DEHP)	<1000 PPM (0.1% by weight)
Butyl Benzyl Phthalate (BBP)	<1000 PPM (0.1% by weight)
Dibutyl Phthalate (DBP)	<1000 PPM (0.1% by weight)
Diisobutyl Phthalate (DIBP)	<1000 PPM (0.1% by weight)

REACH: Mercury Systems, Inc. neither uses nor intentionally adds any of the substances considered to be a Substance of Very High Concern (SVHC) as defined by the EU Regulation (EC) No. 1907-2006 on Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH).

Conflict Materials: Mercury does not knowingly use materials that are sourced from the Democratic Republic of Congo (DRC) or any other known conflict regions. Mercury's supply chain is comprised of sources that are both environmentally and socially responsible. We periodically review this requirement with our vendors to ensure continued compliance.

Mercury takes its responsibility as a global partner seriously and will use due diligence within our supply chain to ensure all standards are met to the best of our knowledge.



Corporate Headquarters

50 Minuteman Road
Andover, MA 01810 USA
+1 978.967.1401 tel
+1 866.627.6951 tel
+1 978.256.3599 fax

International Headquarters

Mercury International

Avenue Eugène-Lance, 38
PO Box 584
CH-1212 Grand-Lancy 1
Geneva, Switzerland
+41 22 884 5100 tel

Learn more

Visit: mrcy.com

For pricing details, contact: MMICsales@mrcy.com

For technical details, contact: MMICsupport@mrcy.com



The Mercury Systems logo is a registered trademark of Mercury Systems, Inc. Other marks used herein may be trademarks or registered trademarks of their respective holders. Mercury products identified in this document conform with the specifications and standards described herein. Conformance to any such standards is based solely on Mercury's internal processes and methods. The information contained in this document is subject to change at any time without notice.

